ITS — *Intelligent Transportation Systems*
U.S. Department of Transportation

> > > Safety Mobility Productivity

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New Initiatives

As highway deaths continue to rise (43,000 in 2003) and growing traffic congestion robs Americans of time and money, the U.S. Department of Transportation's (USDOT) Intelligent Transportation Systems (ITS) program is launching a new generation of initiatives aimed at improving transportation safety, relieving congestion and enhancing productivity. Read more about these new initiatives...

- Cooperative Intersection Collision Avoidance Systems
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Intelligent intersection systems can save lives and prevent injuries by helping drivers avoid crashes.

Cooperative Intersection Collision Avoidance Systems

A Major ITS Initiative

Saving Lives and Preventing Injuries

Each year intersection-related crashes take a heavy toll on lives, productivity, and the economy. In 2003 alone, 8,569 people died and more than 1.4 million suffered injuries as a result of intersection-related crashes. Intelligent intersection systems offer a significant opportunity to improve safety by enhancing driver decision-making at intersections that will help drivers avoid crashes.

Intersection collision avoidance systems use both vehicle-based and infrastructure-based technologies to help drivers approaching an intersection understand the state of activities within that intersection. Cooperative intersection collision avoidance systems (CICAS) have the potential to warn drivers about likely violations of traffic control devices and to help them maneuver through cross traffic. Eventually, CICAS may also inform other drivers (i.e., potential victims) about impending violations as well as identify pedestrians and cyclists within an intersection.

CICAS consists of:

- Vehicle-based technologies and systems—sensors, processors, and driver interfaces within each vehicle

- Infrastructure-based technologies and systems—roadside sensors and processors to detect vehicles and identify hazards and signal systems, messaging signs, and/or other interfaces to communicate various warnings to drivers

- Communications systems—dedicated short-range communications (DSRC) to communicate warnings and data between the infrastructure and equipped vehicles

Understanding Safety Benefits and User Acceptance

The CICAS initiative builds on research and operational tests previously conducted under the US DOT's Intelligent Vehicle Initiative. It is being closely coordinated with the Vehicle Infrastructure Integration and the Intelligent Vehicle-Based Safety Systems initiatives. The CICAS initiative working group is being formed from partnerships with automotive manufacturers, State and local departments of transportation, and university research centers throughout America.

Through additional research, system integration activities, and demonstrations, the CICAS initiative will produce a system prototype that addresses both control violations and gap acceptance crash problems. The initiative will culminate in a series of coordinated field operational tests to help achieve a solid understanding of safety benefits and user acceptance.

U.S. Department of Transportation

A common electronic freight manifest would improve the speed, accuracy, and visibility of information transfer in a freight movement, which could reap large rewards for the U.S. economy.

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Electronic Freight Manifest
A Major ITS Initiative

Implementing a Common Electronic Freight Manifest

Freight volumes by 2020 are forecasted to increase by 70 percent from 1998 totals. The amount of freight moved through international ports of entry for goods shipped to the United States (or "gateways") – including seaports such as Long Beach, California, land border crossings, such as Detroit, and international airports such as JFK in New York – could more than double. Improving speed, accuracy, and information transfer when freight is transferred from one mode of transportation to another benefits the U.S. economy.

Developing a Universal Electronic Freight Manifest

The EFM initiative builds on a previous ITS freight operational test that focused on one domestic truck-air-truck supply chain. The test demonstrated a cost savings of $1.50–$3.50 per shipment, due mostly to time and labor savings. The EFM effort will test the technology and business case elements of an international supply chain deployment. It has the potential to reduce the amount of paper used in the transfer of information among the supply chain elements (e.g., manufacturer, shipper, freight forwarder to air carriers). Work to date has been focused on truck-air-truck freight interface.

Building on the success of an electronic manifest in the truck-air-truck interface, the next step could include other modal interfaces (e.g., truck-truck, truck-rail, rail-sea, and truck-sea).

In partnership with shippers and carriers, the EFM effort will be directed at:

- Clearing institutional barriers

- Demonstrating standardization of information exchange between supply chain partners

- Building public/private partnerships that showcase operational improvements

- Identifying criteria that move the industry toward implementation of this freight technology and associated operational practices

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Proven and promising ITS technologies will be used to improve mobility and enhance productivity on major corridors in large metropolitan areas.

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Integrated Corridor Management Systems
A Major ITS Initiative

Improving Transportation Corridor Management Systems

Traveling within a busy city can be frustrating and time-consuming. Traffic congestion continues to grow, with the greatest concentration of congestion along the principal routes in major metropolitan areas. These "critical corridors" that link activity centers (e.g., business centers, sports arenas, and shopping areas) with residential areas carry the highest volumes of people and goods. Despite an array of transportation management tools, integrated corridor management has not naturally emerged.

Collaboration between planning and operations communities and integration of travel management tools could help shift travel demands between facilities and modes, thus reducing delays and increasing reliability and predictability of travel. Unused corridor capacity often exists on parallel routes, on the non-peak direction on freeways and arteries, within single-occupant vehicles, and in transit vehicles. Shifts in travel demand to unused capacity can be accomplished by delivering real time travel data through in-vehicle devices, changeable message signs, and 511 services, as well as through various traffic and transit management strategies, including adaptive traffic signal and ramp metering systems. This initiative will demonstrate how ITS technologies can efficiently and proactively manage the movement of people and goods in major transportation corridors in large cities. A planned model deployment will show how proven and promising ITS technologies, working together, can improve corridor mobility and productivity.

Achieving Integration

This initiative builds on many individual tools already developed.. Corridor management can be achieved through collaboration and coordination between the operations and planning communities and through integration of the services that these agencies provide.

In partnership with State and local governments, this initiative will:

- Pull together ongoing, nearly completed, and planned work into a proactive corridor management focus

- Identify and close knowledge gaps

- Design and implement a major model deployment and other technology transfer activities that will give the transportation community the information and tools it needs to make improvements in corridor management

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ITS technologies provide the means to create a one-stop, customer-based travel reservation, information, and trip planning service for human service transportation.

Mobility Services for All Americans

A Major ITS Initiative

Extending Transportation Service Partnerships

For most people, getting to work, to the doctor, or to worship services means getting in the car. But for others, it's not that easy. There are often challenges that individuals face when trying to "get a ride." This is despite the recognition by nearly every human service program that transportation is important. In fact, transportation services are currently spread among 62 federal programs. And Americans – through taxes and charitable contributions – are spending a significant amount of money in order to help.

The goal of the Mobility Services for All Americans (MSAA) initiative is to improve transportation services and simplify access to employment, healthcare, education, and other community activities by means of the advanced technologies of Intelligent Transportation Systems (ITS) and through extending transportation service partnerships with consumers and human service providers at the federal, State, and local levels.

This ITS initiative is related to the United We Ride national campaign that implements the Executive Order on Human Service Transportation Coordination (#13330) issued by President Bush in February 2004. The Executive Order requires ten federal departments to work together to enhance transportation access, minimize duplication of federal services, and facilitate the most appropriate, cost-effective transportation for older adults, people with disabilities, and low-income populations.

Using Technology to Simplify Access to Human Service Transportation Systems

MSAA and United We Ride envision a one-stop, customer-based travel reservation, information, and trip planning service. Several ITS technologies will be applied, including:

- Geographic information systems (GIS)
- Integrated vehicle dispatching and scheduling
- Automatic vehicle location (AVL)
- Communications systems
- Electronic payment systems/financial tracking and billing systems
- Advanced traveler information systems (ATIS)

For additional information visit the United We Ride website: www.unitedweride.gov.

UNITED WE RIDE

U.S. Department of Transportation

Nationwide deployment of a communications infrastructure on the road-ways and in all production vehicles could improve transportation and the quality of American life in ways not imagined a generation ago.

For more information about this US DOT initiative:

www.its.dot.gov/vii

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Vehicle Infrastructure Integration (VII)
A Major ITS Initiative

Crash Prevention and Congestion Relief Through Vehicle-to-Vehicle and Vehicle-to-Roadside Communication

About half of the 43,000 deaths that occur each year on U.S. highways result from vehicles leaving the road or traveling unsafely through intersections. Traffic delays continue to increase, wasting more than a 40-hour workweek for peak-time travelers. A significant reduction in these numbers could be achieved through coordinated development of a nationwide wireless communication infrastructure that would allow communication between vehicles and between the vehicle and the roadside.

The VII vision is that every car manufactured in the U.S. would be equipped with a communications device and a GPS unit so that data could be exchanged with a nationwide, instrumented roadway system. Realization of this vision could mean a significant reduction in highway fatalities, while at the same time offering dramatic improvements in transportation mobility.

The VII initiative will build on the availability of advanced vehicle safety systems developed under the Intelligent Vehicle Initiative (IVI) and on the results of related research and operational tests. The fundamental building blocks of the VII concept are coordinated deployments of communication technologies:

- In all vehicles by the automotive industry
- On all major U.S. roadways by the transportation public sector

Implementing Strategies to Save Lives and Relieve Traffic Congestion

Secure data transmitted from the roadside to the vehicle could warn a driver that it is not safe to enter an intersection or that the vehicle is dangerously close to running off the road. Vehicles serving as data collectors could anonymously transmit traffic and road condition information from every major road within the transportation network, giving transportation agencies the information needed to take action to relieve traffic congestion.

Protection of privacy is paramount. The intent is that general data collected by the public sector would be anonymous and used only for safety purposes and for efficient management of transportation operations. It is expected that this technology will facilitate a number of uses that drivers may choose such as electronic toll collection or telematics services for which some private information might be required. For those services, the intent is that the owner or driver would have to "opt in" and give permission for that information to be shared.

A VII consortium has been established to determine feasibility of widespread deployment and to establish an implementation strategy. Current membership includes USDOT, AASHTO, ten State DOTs and several light vehicle manufacturers.

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Clarus will make use of the over 2,100 environmental sensor stations that are already deployed along America's highways to help reduce the impact of adverse weather for all road users and operators. >>>

For more information about this US DOT initiative:

www.its.dot.gov/clarus

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Nationwide Surface Transportation Weather Observing and Forecasting System—Clarus

A Major ITS Initiative

Reducing the Impact of Adverse Weather

Adverse weather affects road safety, mobility, and the productivity of transportation agencies. A nationwide, integrated road weather observational network and data management system will mitigate the effects of adverse weather on all surface transportation users and operators by providing timely and accurate weather, pavement, and water level information.

Efforts to date to deploy Road Weather Information Systems (RWIS), and the Environmental Sensor Stations (ESS) that feed the road and weather observations into the systems, have proven effective, and more than 2,100 ESSs are currently in use throughout the United States. These systems, however, do not provide full-scale data sharing, which limits their functionality. A focused, national effort is needed to build a nationwide, integrated road weather observational network.

Deploying the Network

Deploying a road weather observational network requires a multiyear effort to build consensus across transportation and weather communities to design, build, test, and evaluate the system components. The Clarus initiative builds on the Federal Highway Administration's (FHWA) developing partnership with the National Oceanic and Atmospheric Administration (NOAA) and NOAA's efforts to improve the safety and efficiency of America's commerce.

This initiative involves:

- Establishing an Initiative Coordinating Committee (ICC) consisting of FHWA, NOAA, State departments of transportation, academia, and the private sector
- Overseeing the conceptual design and monitoring progress
- Completing research projects related to the initiative
- Demonstrating the system for a multistate, multidisciplinary region
- Exploring linkages to other databases, including other weather, traffic, road composition, flood monitoring, and road treatment data
- Developing guidance and standards to enable deployment by others, including full software documentation
- Refining the strategy to transition the system to sustainable operations
- Working with the ICC to transition to operations

For additional information, please refer to: www.clarusinitiative.org.

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ITS technologies will help to identify the appropriate response and get the correct equipment and emergency personnel to and from the scene quickly and safely.

Emergency Transportation Operations
A Major ITS Initiative

Faster and Better Prepared Responses to Major Incidents

Over 400 tropical storms, hurricanes, tornadoes, and highway HAZMAT incidents require evacuation each year in the United States. These, plus winter weather, wild fires, complex multi-vehicle crashes, and potential security incidents, require the United States to be prepared for any eventuality. Responders must reach the scene, victims must evacuate the danger zone, and clearance and recovery resources must arrive on time.

Effective real-time management of transportation during major incidents results in more timely responses to highway and hazmat incidents, and shorter incident durations. This initiative aims to improve the management of all forms of transportation emergencies through the application of ITS technologies. Advances in in-vehicle communication and information systems will provide access to essential real-time data about an incident and about transportation conditions on all routes throughout the affected region.

Improving Response and Recovery

Building on the ITS program's incident management efforts, the Emergency Transportation Operations initiative will assist responders in:

- Verifying the nature of a problem
- Identifying the appropriate response
- Getting the correct equipment and personnel resources to and from the scene quickly and safely

This US DOT initiative, in partnership with the public safety community and State and local departments of transportation, addresses:

- Providing effective traveler information during major disasters
- Planning and managing major incidents involving evacuation
- Getting ITS into operation quickly during a disaster
- Using ITS to monitor travel conditions on alternate and evacuation routes

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An integrated counter-measure system could prevent over 48 percent of rear-end, run-off-road, and lane change crashes. This represents more than 1.8 million target crashes.

Integrated Vehicle Based Safety Systems
A Major ITS Initiative

Preventing Collisions the Smart Way

About 2.6 million rear-end, road departure, or lane change crashes occur each year. Of these, 27,500 crashes (about 3/4 of the total fatal crashes) result in one or more fatalities.

The widespread deployment of advanced integrated driver assistance systems has the potential to reduce rear-end, road departure, and lane change collisions by 48 percent. Integrated systems will provide better hazard information from multiple sensors, enabling coordinated warnings to reduce driver distraction. The Integrated Vehicle Based Safety Systems (IVBSS) initiative aims to equip all new vehicles with advanced driver assistance systems that would help drivers avoid the most common types of deadly crashes.

An Integrated Solution

This initiative, in partnership with the automotive industry, builds on completed and ongoing Intelligent Vehicle Initiative (IVI) field operational tests as well as results from naturalistic driving studies. It will involve projects and studies that include private passenger vehicles, freight-carrying trucks, and transit buses.

The IVBSS initiative will:

- Develop information on how best to communicate an integrated warning to the driver

- Develop objective tests and criteria for performance of systems that simultaneously address rear-end, road departure, and lane change crashes

- Develop and field test integrated vehicle-based safety systems on the road with real drivers to understand the safety benefits of integrated systems

This initiative is the first attempt to fully integrate the individual solutions that address these three types of crashes. This research will combine existing research results and state-of-the-art commercial products and product performance for all systems related to this problem.

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Improved technology for 9-1-1 will enhance driver safety and mobility by enabling motorists to send quicker, more accurate, and more useful forms of information about incidents to emergency dispatch centers.

Next Generation 9-1-1 Service
A Major ITS Initiative

Enhancing 9-1-1 Wireless

Text, data, images, and video are increasingly common in personal communications and are critical to future transportation safety and mobility advances. However, the 9-1-1 system of the 1970s was created to transmit voice media only and was not designed to handle the challenges of multimedia communication in a wireless, mobile society. The goal of the Next Generation 9-1-1 (NG9-1-1) initiative is to define the Next Generation 9-1-1, to design a system to support it, and to develop a transition plan and framework for implementation.

The NG9-1-1 initiative will leverage the progress from the Secretary of Transportation's Wireless E9-1-1 Initiative, which has enhanced location capability for 9-1-1 calls placed from wireless phones. The Next Generation 9-1-1 initiative will establish the foundation for public emergency services in this wireless environment and enable an enhanced 9-1-1 system compatible with any communications device.

Communicating Effectively with 9-1-1 Centers

The initiative's first phase will determine operational policies and user requirements for an Internet- and multimedia-capable 9-1-1 system. In partnership with the 9-1-1 community and the private sector, this initiative will:

* Establish call center requirements

* Establish operational policies and standards

* Increase public and industry awareness of the implementation issues in 2005

The next generation 9-1-1 system will be defined during the second phase of this initiative. By 2007 the initiative will describe and document the framework to enable common devices (cellular telephones, PDAs, computers, and others) to communicate effectively with 9-1-1 call centers.

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